

Appl. No.: 09/384,389
Amdt. Dated: 02/24/2006
Off. Act. Dated: 08/24/2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (canceled)

2. (currently amended): A fuel cell comprising:
 - a. a single flexible or ridged bipolar separator plate;
 - b. a flexible membrane electrode assembly;
 - c. a flexible seal, adhesive or gasket interposed between said single flexible or ridged bipolar separator plate and said flexible membrane electrode assembly, wherein said flexible seal, adhesive or gasket between said flexible or ridged bipolar separator plate and said flexible membrane electrode assembly comprises the fuel cell module, and wherein said flexible seal, adhesive or gasket is optionally an adhesive which encapsulates edge portions of said flexible or ridged bipolar separator plate and said flexible membrane electrode assembly and wherein said flexible seal, adhesive or gasket seals the edge portions of said flexible membrane electrode assembly to prevent the release of reactants from the fuel cell, and where the edge portion of the flexible or ridged bipolar separator plate is ~~rolled~~, bent over, or crimped over the edge of the said flexible membrane electrode assembly ~~so as to overlap a substantial portion of said flexible membrane electrode assembly~~ to prevent the release of reactants from the fuel cell;
 - d. a manifold for the delivery and removal of reactants and reactant products to and from the fuel cell reactive areas where said manifolds may be either a single or multiple manifolds; and

e. bond interposed between said manifold and said flexible or ridged bipolar separator plate, wherein said bond affixes said manifold to said flexible or ridged bipolar separator plate and wherein said bond provides a seal between said manifold and said flexible or ridged bipolar separator plate to prevent the release of reactants from the fuel cell.

3. (previously presented): The fuel cell of claim 2 wherein said fuel cell is assembled as a single cell module which is assembled with additional single cell modules to create a fuel cell stack or unit.

4. (previously presented): The fuel cell of claim 2 wherein said fuel cell module in claim 2 comprises said single flexible or ridged bipolar separator plate, said membrane electrode assembly, said flexible adhesive bond, seal or gasket between said single flexible or ridged bipolar separator plate and said membrane electrode assembly, said manifold or manifolds, said adhesive bond or bonds interposed between said manifold or manifolds and said flexible or ridged bipolar separator plate.

5. (currently amended): The fuel cell of claim 2 wherein said bipolar separator plate comprises a metal material, a composite material, a polymeric plastic material, or combinations thereof.

6. (currently amended): The fuel cell of claim 2 above wherein the bipolar separator plate has a thickness between about 0.0001 inch and about 0.500 inch and area of between 0.1 inches square and 5000 inches square.

7. (currently amended): The fuel cell of claim 2 wherein the bipolar separator plate is of a square configuration, a rectangular configuration or other polygonal configuration, a circular configuration or any other rounded configuration.

8. (currently amended): The fuel cell of claim 2 above wherein said adhesive, seal or gasket is applied to said bipolar separator plate or said adhesive, seal or gasket is applied to said membrane electrode assembly and said bipolar separator plate and said membrane electrode assembly are bonded and or sealed together as a single unit.

9. (previously presented): The fuel cell of claim 2 wherein said adhesive bond of support 2c is a gasket.

10. (previously presented): The fuel cell of claim 2 wherein the gasket comprises a plastic polymeric material, or an elastomeric material, a composite material, a metallic material, a foam material, or combinations thereof.

11. (previously presented): The fuel cell of claim 2 wherein said adhesive bond, seal or gasket forms part of the reactant flow field.

12. (previously presented): The fuel cell of claim 2 wherein said manifolds are external to the BSP and the MEA as to not cause disruption or through holing of the MEA either internal or external to the electrochemically active area.

13. (previously presented): The fuel cell of claim 2 wherein said manifolds are bonded to said BSP.

14. (previously presented): The fuel cell of claim 2 wherein said manifolds are comprised of a plastic material, or a composite material, or a metallic material.

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15. (previously presented): The fuel cell of claim 2 wherein said manifold is a single manifold.

16. (previously presented): The fuel cell of claim 2 wherein said manifolds are multiple in nature up to 26 manifolds.

17. (previously presented): The fuel cell of claim 2 wherein said manifolds have passages for a single reactant or multiple reactants and or a coolant or multiple coolants.

18. (currently amended): The fuel cell of claim 2 wherein the bond between said manifold or manifolds and said membrane electrode assembly comprises a plastic material, an elastomeric material, a composite material, a metallic material, a foam material, or combinations thereof.

Claim 19 (canceled)

20. (currently amended): The fuel cell of claim 2 wherein the bent[[,]] or crimped or rolled edge is continuous or discontinuous around the periphery of the entire fuel cell.

Claim 21 (canceled)

22. (previously presented): The fuel cell of claim 8 wherein the gasket comprises a plastic polymeric material, an elastomeric material, a composite material, a metal, a foam, or combinations thereof.

23. (currently amended): A fuel cell module comprising:
- a. a bipolar separator plate ("BSP") having a perimeter edge portion ("BSP");
 - b. a single flexible membrane electrode assembly ("MEA"), wherein the perimeter edge portion of the BSP is ~~rolled~~, bent over, or crimped over the edge of the MEA ~~flexible membrane assembly so as to overlap a substantial portion of said flexible membrane electrode assembly~~, thereby aiding in preventing the release of reactants and reactant products from the perimeter of the module[.];
 - c. a flexible bond, seal or gasket interposed between the BSP and the MEA, wherein said flexible bond, seal or gasket seals the edge portions of the BSP and the MEA to prevent the release of reactants from the edge of the fuel cell module;
 - d. a manifold that is external to the BSP and the MEA for delivery of reactants to and removing reactants from the fuel cell reactive areas; and
 - e. a bond between the manifold and the BSP to affix the manifold to the BSP and provide a seal between the manifold and the BSP to prevent the release of reactants from the fuel cell module.
24. (previously presented): The fuel cell module of claim 23 assembled with at least one other fuel cell module of claim 23 to create a fuel cell stack.
25. (previously presented): The fuel cell module of claim 23 wherein the BSP comprises a metal material, a composite material, a polymeric plastic material, or combinations thereof.
26. (previously presented): The fuel cell of claim 23, wherein the BSP has a thickness between about 0.0001 inch and 0.500 inch and an area of between 0.1 inches square and 5000 inches square.

27. (previously presented): The fuel cell module of claim 23, wherein the BSP is of a square configuration, a rectangular configuration or other polygonal configuration, a circular configuration or any other rounded configuration.

28. (previously presented): The fuel cell module of claim 23, wherein the adhesive, seal or gasket is applied to the BSP or MEA to bond them together as a single unit.

29. (previously presented): The fuel cell module of claim 23, wherein the edge portions of the BSP and MEA are sealed with a gasket.

30. (previously presented): The fuel cell module of claim 29, wherein the gasket comprises a plastic polymeric material, an elastomeric material, a composite material, a metallic material, a foam material, or combinations thereof.

31. (previously presented): The fuel cell module of claim 23, wherein the adhesive bond, seal or gasket forms part of the reactant flow field.

32. (previously presented): The fuel cell module of claim 23, wherein the manifold is bonded to the BSP.

33. (previously presented): The fuel cell module of claim 23, wherein the manifold comprises a plastic material, a composite material, or a metallic material.

34. (previously presented): The fuel cell module of claim 23, wherein the manifold is a single manifold.

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35. (previously presented): The fuel cell module of claim 23, wherein there is a plurality of manifolds.

36. (previously presented): The fuel cell module of claim 35, wherein said manifolds have passages for a single reactant or multiple reactants and/or a coolant or multiple coolants.

37. (currently amended): The fuel cell module of claim 36, wherein the bent[[.]] or crimped ~~or rolled~~ edge is continuous or discontinuous around the periphery of the entire fuel cell module.